Influence of Rearing Systems on the Production Performance of "*TANUVAS Namakkal quail - 1*" Breeder Male Line

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ABSTRACT: An experiment was conducted with a total of 400 straight run "*TANUVAS Namakkal Quail - 1*" male breeder line chicks, these chicks were weighed, wing banded, and randomly assigned to 2 treatments, each 5 replicates 40 chicks each. The two systems namely deep litter and cage were selected to study the production performance of birds. The result showed that the body weight of the cage-reared birds on the sixth week of age was significantly (P<0.01) better than in deep litter (238.16±0.54 vs 231.67±0.55 g) and the body weight gain is also better in cage-reared birds. The cumulative feed consumption up to 6 weeks of age was non-significant in deep litter rearing systems, while the feed conversion ratio was significant at P<0.05 level during the first week and P<0.01 level during 2-6 week of age in cage rearing systems. The cost of production up to six weeks of age is lower with cage rearing than in deep litter.

Keywords: "*TANUVAS Namakkal quail -1*", male breeder line, deep litter rearing, cage rearing, body weight, weight gain, feed consumption, feed conversion ratio.

INTRODUCTION

Most developing countries consider, increasing the nutritional security of their community not only through agriculture but also by looking for a better protein source at a cheaper cost. Japanese quail; meat and eggs are considered a good source of animal protein that can alleviate protein hunger among developing countries (Punya Kumari *et al*., 2008). Japanese quail have the advantage of rapid growth rate, small size, good reproductive potential, shorter life cycle, low feed requirements, good meat taste, better laying ability, and shorter time of hatching as compared with the different species of poultry (Roshdy *et al*., 2010). Japanese quail have been reared from ancient times in East and South East Asia as singing birds, quails were reared in Japan from the 12th century (Kovach 1974) for their songs, and quail eggs and meat were used as food in Asia from the 17th century onward (Lukanov and Pavlova 2020). At the end of the 19th and beginning of the 20th century, the true domestication of Japanese quail started for higher growth rate and egg production from the original population (Genchev 2012; Hossain *et al*., 2015). Several studies were done in the past to study productive performance of quails with respect of various influencing factors. A new meat type Japanese quail strain "*TANUVAS Namakkal Quail - 1*" having normal range plumage was evolved based on 4 way crossing technique (L3214) by the Department of Poultry Science, Veterinary College and Research Institute, Namakkal under Tamil Nadu Veterinary and Animal Sciences University. The performance of the male parent line is most important in the flock's production and reproduction of the filial generations. In general most of the farmers rearing quail in either deep litter shed or in cages, to identify and choose the best system of management feasible to the farming community. Hence, the study has been carried out to evaluate the effect of different rearing systems namely deep litter and cages regarding production parameters of "*TANUVAS Namakkal quail - 1*" male breeder line (L32).

MATERIAL AND METHODS

An experiment was conducted to study the production performance of "*TANUVAS Namakkal Quail -1*" breeder male line chicks in different rearing systems at Poultry Farm Complex, Department of Poultry Science, Veterinary College and Research Institute, Namakkal. A total of 400-day-old "*TANUVAS Namakkal quail - 1*" male breeder line (L32) chicks hatched in a single hatch were divided into two groups and 5 replicates with 40 chicks per replicate, individually weighed, wing banded, and brooded using incandescent bulbs in deep litter pens

and cages. The experiment was conducted up to six weeks of age. All standard managemental practices were adopted during the rearing period. The procedure of lighting 24 hours during 0-2 weeks of age and 12 hours of lighting, 12 hours of darkness during 3-6 weeks of age was practiced. The body weight of the quails was weighed individually and recorded at weekly interval before feeding using 0.1g accuracy. The quails were provided *ad-libitum* chick and grower mash during 0-2 weeks and 3-6 weeks respectively. The leftover feed was weighed to calculate the feed consumed. From these details the mean weekly weight gain, feed conversion ratio and feed cost were calculated.

Statistical analysis: The data were analyzed as per the standard statistical procedure described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Body weight and weight gain (g): The influences of rearing system on the mean body weight and body weight gain of "TANUVAS Namakkal quail-1" are presented in Table 1 and 2 respectively. The body weight showed a significant (P<0.01) difference among deep litter and cage-rearing systems. The body weight (g) of quails reared in the deep litter at hatch, 1st, 2nd, 3rd, 4th, 5th and 6th week of age were 9.12, 24.99, 49.62, 106.77, 167.1, 202.15 and 231.67 g whereas the cage reared birds were 9.11, 25.87, 51.60, 110.77, 170, 208.06 and 238.16 g respectively. Similarly, there was a significant difference in body weight gain of deep litter and cage-reared birds during the 6th week of age 222.55 and 229.05 g respectively. The body weight gain in Japanese quail reflects similar trends related to body weight. The restricted movement of caged birds saving energy when compared to deep litter reared may be the reason considered for the difference. Badawi (2017); El-Sagheer *et al*. (2012) reported that the Japanese quails reared in cages had a higher body weight than floor pens, but the results were in significant. In contradiction to the results Roshdy *et al*. (2010); Razee *et al*. (2016) reported that the floor pen-reared birds had a higher body weight and weight gain.

Table 1: Influence of rearing systems on (Mean ± S.E.) body weight (g) of "*TANUVAS Namakkal quail -1*" male breeder line (straight run) from hatch to six weeks of age.

Age (in weeks)	T₁ (DL) (n=200)	T₂(Cage) (n=200)	t - value	p-value
Hatch weight	9.12 ± 0.03	9.11 ± 0.02	0.18	0·858
I	24.99 ± 0.08	25.87 ± 0.16	4.97	0.000**
II	49.62 ± 0.19	51.60 ± 0.20	7.26	0.000**
III	106.77 ± 0.30	110.77 ± 0.31	9.24	0.000**
IV	167.15 ± 0.32	170.06 ± 0.34	6.22	0.000**
V	202.15 ± 0.32	208.06 ± 0.34	12.64	0.000**
VI	231.67 ± 0.55	238.16 ± 0.54	8.40	0.000**

**Mean between treatments differ significantly (P ≤ 0.01).
The value given in each cell is a mean of 200 observations.

Table 2: Influence of rearing systems on (Mean ± S.E.) body weight gain (g) of "*TANUVAS Namakkal quail -1*" male breeder line (straight run) from one to six weeks of age.

Age (in weeks)	T₁(DL) (n=200)	T₂ (Cage) (n=200)	t - value	p-value
I	15.87 ± 0.07	16.75 ± 0.16	5.155	0.000**
II	40.50 ± 0.19	42.49 ± 0.20	7.251	0.000**
III	97.65 ± 0.30	101.66 ± 0.31	9.209	0.000**
IV	158.03 ± 0.32	160.94 ± 0.34	6.225	0.000**
V	193.03 ± 0.32	198.94 ± 0.34	12.638	0.000**
VI	222.55 ± 0.55	229.05 ± 0.54	8.421	0.000**

** Mean between treatments differ significantly (P ≤ 0.01).
The value given in each cell is a mean of 200 observations.

Feed consumption and feed conversion ratio: The influence of rearing system on the mean cumulative feed consumption of "*TANUVAS Namakkal quail-1*" are presented in Table 3. The mean feed consumption showed non-significant difference among the treatments. Badawi (2017) recorded a similar report of non-significant difference among the floor and cage system of rearing. The cumulative feed consumption of "*TANUVAS Namakkal quail -1*" male breeder line up to 6 weeks of age is 729.40 g in deep litter and 722.00 g in cages, which was comparable with the results obtained by Sangilimadan and Richard Churchill (2018) in deep litter management up to 6 weeks of age and 4 weeks of age by Edwin (2020).

The influence of different rearing system on feed conversion ratio of "*TANUVAS Namakkal quail -1*" are presented in Table 4. The feed conversion ratio is better in cages than deep litter reared "*TANUVAS Namakkal quail-1*" male breeder and it was significant at P<0.05 level during first week and significant at P<0.01 level during 2-6 weeks of age, and the results were comparable with El-Sagheer *et al*. (2012); Gozet *et al*. (2019). Whereas Razee *et al*. (2016) recorded a better feed conversion ratio both in cage and deep litter system of management.

Table 3: Influence of rearing systems on (Mean ± S.E.) feed consumption (g) of "*TANUVAS Namakkal quail-1*" breeder male line (straight run) from 1 to 6 weeks of age.

Age (in weeks)	T_1(DL)	T_2(Cage)	t - value	p-value
I	28.40 ± 0.68	27.08 ± 0.48	1.593	0.15[NS]
II	88.20 ± 0.86	86.00 ± 0.55	2.157	0.06[NS]
III	225.80 ± 0.66	223.40 ± 1.86	1.215	0.26[NS]
IV	384.20 ± 1.69	379.80 ± 1.62	1.880	0.10[NS]
V	541.00 ± 3.07	533.60 ± 2.87	1.761	0.12[NS]
VI	729.40 ± 2.62	722.00 ± 3.27	1.766	0.12[NS]

The value given in each cell is a mean of 5 observations.

Table 4: Mean (± S.E.) feed conversion ratio of "*TANUVAS Namakkal quail-1*" breeder male line (straight run) from 1 to 6 weeks of age as influenced by rearing systems.

Age (in weeks)	T_1 (DL)	T_2 (Cage)	t - value	p-value
I	1.79 ± 0.04	1.62 ± 0.04	3.034	0.016*
II	2.18 ± 0.01	2.03 ± 0.02	6.104	0.000**
III	2.31 ± 0.01	2.20 ± 0.02	4.586	0.002**
IV	2.43 ± 0.01	2.36 ± 0.01	4.699	0.002**
V	2.80 ± 0.01	2.68 ± 0.02	5.252	0.001**
VI	3.28 ± 0.01	3.15 ± 0.01	6.853	0.000**

*Mean between treatments differ significantly (P< 0.05). **Mean between treatments differ significantly (P < 0.01).
The value given in each cell is a mean of 5 observations.

Cost effectiveness: The influence of rearing system on the mean cost effectiveness of "*TANUVAS Namakkal quail -1*" male breeder line (straight run) are presented in Table 5. The cost of production showed Rs.0.28 difference among the treatments.

Table 5: Cost effectiveness of "TANUVAS Namakkal quail-1" breeder male line (straight run) up to six weeks of age as influenced by rearing systems.

Treatment groups	Body weight (kg)	Total feed consumed (kg)		Cost of feed per kg (Rs.)		Total feed cost per bird (Rs.)	Cost of production per bird (Rs.)
		Starter	Finisher	Starter	Finisher		
T_1 (DL)	0.232	0.088	0.641	43.00	40.00	29.42	45.42
T_2 (Cage)	0.238	0.086	0.636	43.00	40.00	29.14	45.14

Chick cost   Rs. 15.00 per chick
Miscellaneous cost   Rs. 1.00 per bird

CONCLUSIONS

It is concluded from the results of this study that the rearing system had significant influence on the performances of body weight, body weight gain and feed conversion ratio of "TANUVAS Namakkal quail-1" male breeder during growing period. So, the quails perform better in cage system of rearing than deep litter system. Even though the fixed cost involvement is more, the cage rearing system of Japanese quail is recommended to exploit the potency better results.

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